

any authorized bandwidth that does not exceed the channel size.

(e) For operations in the 764 to 776 MHz and 794 to 806 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

(f) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

[70 FR 21666, Apr. 27, 2005]

EFFECTIVE DATE NOTE: At 72 FR 48862, Aug. 24, 2007, §90.543 was amended by amending paragraph (a) by removing the tables titled "150 kHz Mobile Transmitter ACP Requirements" and "150 kHz Base Transmitter ACP Requirements", redesignating paragraphs (e) and (f) as paragraphs (f) and (g), revising the introductory text, paragraph (b)(1) and newly redesignated paragraphs (f) and (g), and adding new paragraph (e), effective October 23, 2007. For the convenience of the user, the added and revised text is set forth as follows:

§ 90.543 Emission limitations.

Transmitters designed to operate in 769-775 MHz and 799-805 MHz frequency bands must meet the emission limitations in paragraphs (a) through (d) of this section. Transmitters operating in 763-768 MHz and 793-798 MHz bands must meet the emission limitations in (e) of this section.

\* \* \* \* \*

(b) \* \* \*

(1) *Setting reference level.* Set transmitter to maximum output power. Using a spectrum analyzer capable of ACP measurements, set the measurement bandwidth to the channel size. For example, for a 6.25 kHz transmitter set the measurement bandwidth to 6.25 kHz. Set the frequency offset of the measurement bandwidth to zero and adjust the center frequency of the instrument to the assigned center frequency to measure the average power level of the transmitter. Record this

power level in dBm as the "reference power level."

\* \* \* \* \*

(e) For operations in the 763-768 MHz and the 793-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(f) For operations in the 763-775 MHz and 793-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

(g) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

§ 90.545 TV/DTV interference protection criteria.

Public safety base, control, and mobile transmitters in the 764-776 MHz and 794-806 MHz frequency bands must be operated only in accordance with the rules in this section, to reduce the potential for interference to public reception of the signals of existing TV and DTV broadcast stations transmitting on TV Channels 62, 63, 64, 65, 67, 68 or 69.

(a) *D/U ratios.* Licensees of public safety stations must choose site locations that are a sufficient distance from co-channel and adjacent channel TV and DTV stations, and/or must use reduced transmitting power or transmitting antenna height such that the

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following minimum desired signal to undesired signal ratios (D/U ratios) are met:

(1) The minimum D/U ratio for co-channel stations is 40 dB at the hypothetical Grade B contour (64 dBµV/m) (88.5 kilometers or 55.0 miles) of the TV station or 17 dB at the equivalent Grade B contour (41 dBµV/m) (88.5 kilometers or 55.0 miles) of the DTV station.

(2) The minimum D/U ratio for adjacent channel stations is 0 dB at the hypothetical Grade B contour (64 dBµV/m) (88.5 kilometers or 55.0 miles) of the TV station or -23 dB at the equivalent Grade B contour (41 dBµV/m) (88.5 kilometers or 55.0 miles) of the DTV station.

(b) *Maximum ERP and HAAT.* The maximum effective radiated power (ERP) and the antenna height above average terrain (HAAT) of the proposed land mobile base station, the associated control station, and the mobile transmitters shall be determined using the methods described in this section.

(1) Each base station is limited to a maximum ERP of 1000 watts.

(2) Each control station is limited to a maximum ERP of 200 watts and a maximum HAAT of 61 m. (200 ft).

(3) Each mobile station is limited to a maximum ERP of 30 watts and a maximum antenna height of 6.1 m. (20 ft.).

(4) Each portable (handheld) transmitter is limited to a maximum ERP of 3 watts.

(5) All transmitters are subject to the power reductions given in Figure B of §90.309 of this chapter, for antenna heights higher than 152 meters (500 ft).

(c) *Methods.* The methods used to calculate TV contours and antenna heights above average terrain are given in §§73.683 and 73.684 of this chapter. Tables to determine the necessary minimum distance from the public safety station to the TV/DTV station, assuming that the TV/DTV station has a hypothetical or equivalent Grade B contour of 88.5 kilometers (55.0 miles), are located in §90.309 and labeled as Tables B, D, and E. Values between those given in the tables may be determined by linear interpolation. The locations of existing and proposed TV/DTV stations during the transition period are given in Part 73 of this chapter and in the final proceedings of MM Docket No. 87-268. The DTV allotments are:

State	City	NTSC TV Ch.	DTV Ch.	ERP (kW)	HAAT (m)
California .....	Stockton .....	64	62	63.5	874
California .....	Los Angeles .....	11	65	688.7	896
California .....	Riverside .....	62	68	180.1	723
California .....	Concord .....	42	63	61.0	856
Pennsylvania .....	Allentown .....	39	62	50.0	302
Pennsylvania .....	Philadelphia .....	6	64	1000.0	332
Pennsylvania .....	Philadelphia .....	10	67	791.8	354
Puerto Rico .....	Aguada .....	50	62	50.0	343
Puerto Rico .....	Mayaguez .....	16	63	50.0	347
Puerto Rico .....	Naranjito .....	64	65	50.0	142
Puerto Rico .....	Aguadilla .....	12	69	691.8	665

The transition period is scheduled to end on December 31, 2006. After that time, unless otherwise directed by the Commission, public safety stations will no longer be required to protect reception of co-channel or adjacent channel TV/DTV stations.

(1) Licensees of stations operating within the ERP and HAAT limits of paragraph (b) must select one of three methods to meet the TV/DTV protection requirements, subject to Commission approval:

(i) utilize the geographic separation specified in the tables referenced below;

(ii) Submit an engineering study justifying the proposed separations based on the parameters of the land mobile station and the parameters, including authorized and/or applied for facilities, of the TV/DTV station(s) it is trying to protect; or,

(iii) obtain written concurrence from the applicable TV/DTV station(s). If this method is chosen, a copy of the

agreement must be submitted with the application.

(2) The following is the method for geographic separations.

(i) Base stations having an antenna height (HAAT) less than 152 m. (500 ft.) shall afford protection to co-channel and adjacent channel TV/DTV stations in accordance with the values specified in Table B (co-channel frequencies based on 40 dB protection) and Table E (adjacent channel frequencies based on 0 dB protection) in §90.309 of this part. For base stations having an antenna height (HAAT) between 152-914 meters (500-3,000 ft.) the effective radiated power must be reduced below 1 kilowatt in accordance with the values shown in the power reduction graph in Figure B in §90.309 of this part. For heights of more than 152 m. (500 ft.) above average terrain, the distance to the radio path horizon will be calculated assuming smooth earth. If the distance so determined equals or exceeds the distance to the hypothetical or equivalent Grade B contour of a co-channel TV/DTV station (*i.e.*, it exceeds the distance from the appropriate Table in §90.309 to the relevant TV/DTV station) an authorization will not be granted unless it can be shown in an engineering study (method 2) that actual terrain considerations are such as to provide the desired protection at the actual Grade B contour (64 dB $\mu$ V/m for TV and 41 dB $\mu$ V/m for DTV stations), or that the effective radiated power will be further reduced so that, assuming free space attenuation, the desired protection at the actual Grade B contour (64 dB $\mu$ V/m for TV and 41 dB $\mu$ V/m coverage contour for DTV stations) will be achieved. Directions for calculating powers, heights, and reduction curves are listed in §90.309 for land mobile stations. Directions for calculating coverage contours are listed in §§ 73.683-685 for TV stations and in §73.625 for DTV stations.

(ii) Control and mobile stations (including portables) are limited in height and power and therefore shall afford protection to co-channel and adjacent channel TV/DTV stations in accordance with the values specified in Table D (co-channel frequencies based on 40 dB protection) in §90.309 of this part and a minimum distance of 8 kilo-

meters (5 miles) from all adjacent channel TV/DTV station hypothetical or equivalent Grade B contours (adjacent channel frequencies based on 0 dB protection for TV stations and—23 dB for DTV stations). Since control and mobile stations may affect different TV/DTV stations than the associated base station, particular care must be taken by applicants to ensure that all the appropriate TV/DTV stations are considered (*e.g.*, a base station may be operating on TV Channel 64 and the mobiles on TV Channel 69, in which case TV Channels 63, 64, 65, 68, and 69 must be protected). Since mobiles and portables are able to move and communicate with each other, licensees or coordinators must determine the areas where the mobiles can and cannot roam in order to protect the TV/DTV stations, and advise the mobile operators of these areas and their restrictions.

(iii) In order to protect certain TV/DTV stations and to ensure protection from these stations which may have extremely large contours due to unusual height situations, an additional distance factor must be used by all public safety base, control and mobile stations. For all co-channel and adjacent channel TV/DTV stations which have an HAAT between 350 and 600 meters, public safety stations must add the following DISTANCE FACTOR to the value obtained from the referenced Tables in §90.309 and to the distance for control and mobile stations on adjacent TV/DTV channels (96.5 km).

DISTANCE FACTOR = (TV/DTV HAAT-350) + 14 in kilometers, where HAAT is the TV or DTV station antenna height above average terrain obtained from its authorized or proposed facilities, whichever is greater.

(iv) For all co-channel and adjacent channel TV/DTV stations which have an antenna height above average terrain greater than 600 meters, public safety stations must add 18 kilometers as the DISTANCE FACTOR to the value obtained from the referenced Tables in §90.309 and to the distance for control and mobile stations on adjacent TV/DTV channels (96.5 km).

NOTE TO §90.545: The 88.5 km (55.0 mi) Grade B service contour (64 dB $\mu$ V/m) is based on a hypothetical TV station operating at an

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effective radiated power of one megawatt, a transmitting antenna height above average terrain of 610 meters (2000 feet) and the Commission's R-6602 F(50,50) curves. See § 73.699 of this chapter. Maximum facilities for TV stations operating in the UHF band are 5 megawatts effective radiated power at an antenna HAAT of 610 meters (2,000 feet). See § 73.614 of this chapter. The equivalent contour for DTV stations is based on a 41 dBµV/m signal strength and the distance to the F(50,90) curve. See § 73.625 of this chapter.

[63 FR 58651, Nov. 2, 1998, as amended at 65 FR 53646, Sept. 5, 2000; 69 FR 59536, Oct. 4, 2004]

**§ 90.547 Narrowband Interoperability channel capability requirement.**

(a) Except as noted in this section, mobile and portable transmitters operating on narrowband channels in the 764-776 MHz and 794-806 MHz frequency bands must be capable of operating on all of the designated nationwide narrowband Interoperability channels pursuant to the standards specified in this part.

(1) Mobile and portable transmitters that are designed to operate only on the Low Power Channels specified in § 90.531 (b)(3) and (4) are exempt from this Interoperability channel requirement.

(2) Mobile and portable transmitters that are designed to operate only in the data mode must be capable of operation on the data Interoperability channels specified in § 90.531(b)(1)(i); but need not be capable of voice operation on other Interoperability channels.

(3) Mobile and portable transmitters that are designed to operate only in the voice mode do not have to operate on the data Interoperability channels specified in § 90.531(b)(1)(i).

(b) Mobile and portable transmitters designed for data are not required to be voice capable, and vice versa.

[67 FR 61005, Sept. 27, 2002]

EFFECTIVE DATE NOTE: At 72 FR 48863, Aug. 24, 2007, § 90.547 was amended by revising paragraph (a) introductory text, effective October 23, 2007. For the convenience of the user, revised text is set forth as follows:

**§ 90.547 Narrowband interoperability channel capability requirement.**

(a) Except as noted in this section, mobile and portable transmitters operating on narrowband channels in the 769-775 MHz and

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799-805 MHz frequency bands must be capable of operating on all of the designated nationwide narrowband Interoperability channels pursuant to the standards specified in this part.

\* \* \* \* \*

**§ 90.548 Interoperability Technical Standards.**

(a) Transmitters operating on those narrowband channels in the 764-776 and 794-806 MHz band designated for interoperability (See 90.531) shall conform to the following technical standards:

(1) Transmitters designed for voice operation shall include a 12.5 kHz bandwidth mode of operation conforming to the following standards, which are incorporated by reference: Project 25 FDMA Common Air Interface—New Technology Standards Project—Digital Radio Technical Standards, approved April 15, 1998, Telecommunications Industry Association, ANSI/TIA/EIA-102.BAAA-1998; Project 25 Vocoder Description, approved May 5, 1998, Telecommunications Industry Association, ANSI/TIA/EIA-102.BABA-1998.

(2) Transmitters designed for data transmission shall include a 12.5 kHz bandwidth mode of operation conforming to the following standards, which are incorporated by reference: Project 25 Data Overview—New Technology Standards Project—Digital Radio Technical Standards, approved March 3, 2000, Telecommunications Industry Association, ANSI/TIA/EIA-102.BAEA-2000; Project 25 Packet Data Specification—New Technology Standards Project—Digital Radio Technical Standards, approved March 3, 2000, Telecommunications Industry Association, ANSI/TIA/EIA-102.BAEB-2000; Project 25 Radio Control Protocol (RCP)—New Technology Standards Project—Digital Radio Technical Standards, approved March 3, 2000, Telecommunications Industry Association, ANSI/TIA/EIA-102.BAEE-2000; Project 25 FDMA Common Air Interface—New Technology Standards Project—Digital Radio Technical Standards, approved April 15, 1998, Telecommunications Industry Association, ANSI/TIA/EIA-102.BAAA-1998.

(b) The Director of the Federal Register approves these incorporations by reference in accordance with 5 U.S.C.